THE BALANCE OF SOCIAL, ECONOMIC, AND DEMOGRAPHIC CHANGE IN PUERTO RICO—1950-60*

ALLAN G. FELDT AND ROBERT H. WELLER
International Population Program, Cornell University

RESUMEN

Algunos estudios recientes han utilizado los conceptos de balance *y* equilibrio *para interpretar el cambio social que se observa en las sociedades en vías de desarrollo. Se ha tratado de comprobar la validez de estos argumentos determinando la medida en que los cambios occuridos en las características de los municipios de Puerto Rico pueden predecirse sobre la base de su estado de desequilibrio o desviación con respecto a las líneas de regresión que describen la relación entre pares de variables seleccionadas. Nuestras comprobaciones apoyan la validez de los conceptos de balance y desequilibrio utilizados en otros estudios.*

A number of recent studies have dealt with a relatively new approach to the analysis of social and economic development, an approach involving the abstract and rather vague concepts of the equilibrium or balance of various sectors of society as they undergo pressures toward social change.[1] The existence of a complex network of interdependencies between social, economic, and demographic factors within societies has been taken for granted in almost all studies dealing with social change. Seldom, however, has the nature of these interdependencies come so near to seemingly exact specification as it has in the conduct of a few of these investigations.

In the United Nations 1961 *Report on the World Social Situation,*[2] seventy-four countries and territories were analyzed for the extent to which a number of indicators of economic and social development exhibited high degrees of correspondence in their level of development. These countries were grouped according to their level of development on one indicator of economic development and analyzed for the degree to which the level on each of several indicators of social development corresponded to their level of economic development. A number of interesting cases in which a country's level of development in one of these factors was highly "out of balance" with its level of development in the other factor were examined in some detail. A country was generally taken to be "out of balance" when its level of deopment in both factors departed from the average or "normal" behavior of most of the other countries of the world at similar levels of social or economic development. In its conclusion the report stated:

> It may turn out that, in the light of the country's background, there is some obvious reason for the discrepancy. But in many cases, the discrepancy is openly recognized as a gross imbalance and measures have been or are being taken to counteract it. This at least provides a clue to what is meant by imbalance.[3]

In a similar study of the level of national political development of seventy-seven cluntries,[4] Phillips Cutright compared their level of political development to their level of development in communications, urbanization, education, and agriculture by means of regression analysis. Once again the extent to which a country departed from the average or expected behavior of other countries (in this instance as indicated by the regression equation) was taken as an indication of imbalance or disequilibrium in that country's degree of development in either of the two factors being compared. "The difference between the communication index scores that the politically overdeveloped nations (above the [regression] line) really have and what they would have if they were on the regression line may represent the extent of possible imbalance in the social system of the nation."[5]

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* This is a revised version of a paper originally read at the national meetings of the Population Association of America in San Francisco, June, 1964.

[1] See, for example, Phillips Cutright, "National Political Development: Measurement and Analysis," *American Sociological Review*, XXVIII (April, 1963), 253-64; Harvey Leibenstein, *Economic Backwardness and Economic Growth* (New York: Wiley & Sons, 1957); United Nations Department of Economic and Social Affairs, *Report on the World Social Situation* (New York: United Nations, 1961); and Robert H. Weller, "A Sociological Approach to the Problem of Economic Development" (unpublished).

[2] United Nations, *op. cit.*

[3] *Ibid.*, p. 61.

[4] Cutright, *op. cit.*

As in the United Nations report, Cutright argued that nations exhibiting imbalance in the form of deviation from the average behavior of all nations exhibited by the regression line were likely to be subjected to pressures to restore the balance between the two factors by changing either or both factors in such a manner as to move their position to a point closer to the regression line.

Other arguments concerning the existence of implicit balances between the several sectors of a society may be seen in some of the discussions of "overurbanization" which have taken place in recent years. In their discussion of overurbanization in Egypt, Kingsley Davis and Hilda Hertz Golden clearly make reference to the extent to which Egypt deviates from the regression curve characterizing the relationship between degree of economic development and degree of urbanization.[6]

Given the occurrence of a number of such discussions of the balance of social and economic development in recent literature, it is imperative that further attention be given to the meaning of the concept of balance or equilibrium and the extent to which equilibrium can be assumed to be represented by levels of development described by regression equations. If the balance conditions between two highly related factors in a society's development can be said to be roughly equivalent to the average or expected behavior of the several geographical subsystems of that society characterized by a regression line, then a number of important insights regarding policy decisions for development and predictions of social change in developing areas become available to us. Heretofore most of the arguments and predictions regarding equilibrium conditions have been bogged down in conceptual discussions and deductive arguments. If, as these studies imply, the average behavior of countries or of geographic areas within a society represents a mathematical expression of an underlying equilibrium condition, the implications should certainly be fully pursued. This paper represents an attempt to begin the pursuit and testing of some of the implications.

We have attempted to test here the underlying assumption in most of these studies that deviation from the regression line or from some other representation of an average condition represents a state of disequilibrium and that, therefore, *ceteris paribus*, future changes in either or both of the two factors being considered are likely to result in a relationship between them which will lie closer to the regression line. We have attempted to test the proposition that continued deviation from the regression line for two closely related variables is a low probability state and that future changes are most likely to result in movement towards the regression line. Our analysis goes no further than the test of this proposition at this time, since it appears essential to us to demonstrate adequately the validity of this fundamental aspect of the argument before further analyses utilizing such equilibrium assumptions are undertaken. Implicit in the development of this proposition is the assumption of homeostatic conditions seeking to restore balance whenever disequilibrium occurs. Indeed, arguments about equilibrium states without homeostatic assumptions appear to be meaningless.

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[5] *Ibid.*, p. 257.

[6] Kingsley Davis and Hilda Hertz Golden, "Urbanization and the Development of Preindustrial Areas," *Economic Development and Cultural Change*, III (October, 1954), 6–26. For other discussions dealing with overurbanization, see Philip M. Hauser (ed.), *Urbanization in Latin America* (New York: UNESCO, 1961), pp. 36–42; Philip M. Hauser (ed.), *Urbanization in Asia and the Far East* (Calcutta: UNESCO, 1957), pp. 22 and 130–38; Surinder K, Metha, "Some Demographic and Economic Correlates of Primate Cities: A Case for Revaluation," *Demography*, I, No. 1 (1964), 136–47; and N. V. Sovani, "The Analysis of 'Overurbanization,' " *Economic Development and Cultural Change*, XII, No. 2 (January, 1964), 113–22.

At the outset it should be made clear that the concepts of balance and equilibrium are not meant to imply any intrinsic worth or goodness in these conditions. Rather, equilibrium is meant to apply to the nature and stability of relationships between certain components of a country or system of countries. Such relationships may be either desirable or undesirable from a developmental point of view. Likewise the stability of their relationship may be either desirable or undesirable. The point is made by the United Nations staff in their 1961 report[7] that it may be a matter of national policy and public planning to deliberately induce states of imbalance in order to maximize the likelihood of change in any particular setting. In this respect, balance may be a highly undesirable attribute of some social systems, particularly those of underdeveloped countries or regions.

In our analysis, we have sought to test our ability to predict the direction of social change in Puerto Rican municipios during the decade 1950–60. Our study differs from the studies cited above in two important respects. First, the earlier studies were conducted using countries as the basic unit of observation. There is no apparent reason why the same type of analysis cannot be conducted for smaller and more homogeneous regions within a single society. Indeed, it would seem that our ability to observe and predict social, economic, and demographic change would be enhanced by restricting our observations to a single society in which gross cultural and historical discrepancies, as well as disparities in the quality of the data, would not hamper our interpretation of results. This study departs from earlier analyses in a second respect in that it focuses specifically upon social change over a period of time and does not rely solely upon comparative observations for its inferences regarding social change.

The extensive social changes which have occurred in Puerto Rico over the past few decades, together with the ready availability of reliable data for the island, have led us to select it as the site for the comparatively simple analysis reported here. The availability of data of some historical depth also provides an opportunity for extending this analysis to other points in time, although this preliminary work has been restricted to the census periods of 1950 and 1960.

A fairly broad range of variables representing the social, economic, and demographic sectors of Puerto Rican society was examined by means of correlation analysis in order to determine the extent to which marked patterns of relationship were exhibited among the various pairs of variables. Ten pairs of variables having moderately strong and relatively stable coefficients of correlation in both 1950 and 1960 were then selected for further analysis. Since the overall intent of this paper is to deal with questions of the *nature* of the relationships among variables, no particular substantive criteria affected our choice of the pairs of variables for the final analysis. Our initial desire to represent several distinct aspects of Puerto Rican society is still reflected in the range of the variables reported upon here, however. Some attempt to obtain pairs of variables with fairly stable regression equations also affected our choice for the final analysis. The particular pairs of variables selected for further analysis and the values of the correlation coefficients in 1950 and 1960 are given in Table 1.

After examining the ten relationships for evidence of nonlinearity, we plotted each of the linear regression lines for the 1950 data. The eight municipios in each case exhibiting the greatest deviation from the regression line were then selected as representing highly imbalanced cases, according to the arguments advanced in the previously cited works. These eight deviant municipios in each relationship were then examined to determine whether or not they were subjected to changes in either or both of the two variables concerned over the ensuing decade which would result in their 1960 condition exhibiting a position of lower deviance from the regression line.

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[7] United Nations, *op. cit.*

A question of some concern to us throughout this analysis has been the possible relationship of this balance or equilibrium approach to the well known statistical artifact commonly called the re-

Table 1.—RELATIONSHIPS ANALYZED WITH ZERO ORDER CORRELATION COEFFICIENTS IN 1950–60

X Variable	Y Variable	1950 Corr.	1960 Corr.
Fertility Ratio	Population per Household	.54	.79
Percent Labor Force in Non-agric. Employ	Total Dependency Ratio	-.78	-.47
Percent Urban	Doctors per Capita	.74	.59
Percent Labor Force in Non-agric. Employ	Doctors per Capita	.61	.60
Percent Labor Force in Non-agric. Employ	Fertility Ratio	-.75	-.53
Total Dependency Ratio	Population per Household	.71	.64
Percent Labor Force in Manufacturing	Percent Women 14+ in Non-agric. Labor Force	.84	.64
Percent Labor Force in Non-agric. Employ	Population Growth Ratio	.58	.51
Population per Household	Doctors per Capita	-.57	-.43
Percent 14-17 Pop. in School	Doctors per Capita	.50	.44

Fertility Ratio: Children 0-4 per thousand women 15-49.

Population per Household: Total population in households divided by the number of households.

Percent Labor Force in Non-agric. Employ: Persons employed in all activities other than Agriculture, Forestry and Fisheries, and Military divided by total civilian employed labor force.

Total Dependency Ratio: Number of persons 0-14 and 65 or more per thousand population 15-64.

Percent Urban: Percent of total population living in places of 2500 or more.

Doctors per Capita: Number of persons employed in Hospitals and Medical Services per 100 population.

Percent Labor Force in Manufacturing: Number of persons employed in manufacturing divided by total employed labor force.

Percent Women 14+ in Non-agric. Labor Force: All women employed in activities other than Agriculture divided by the number of women 14 or over.

Population Growth Ratio: Population in current decade divided by population in preceding decade.

Percent 14-17 Pop. in School: Number of persons 14-17 enrolled in school divided by total number of persons 14-17.

gression effect.[8] A few comments on this dilemma seem appropriate at this point. In the first place, it should be made quite clear that nothing in our analysis or in the arguments of the previously cited authors is meant to imply that all countries within the world or all municipios within Puerto Rico are being subjected to changes resulting in a position closer to the regression line. On the contrary, the mere fact that in a number of instances the zero order correlations given in Table 1 are lower in 1960 than in 1950 indicates that the general direction of change has been toward greater rather than less dispersion about the regression line. Our arguments, and the inferences from our findings, are meant to be applied to only those particular municipios found to be most deviant at an earlier point in time. We do not wish to make any inferences whatsoever at this time regarding the behavior or changes likely to occur to other municipios on the island. Similar restrictions appear to be contained implicitly in the earlier studies discussed above.

Given this limitation, however, the identity of the statements and expectations derived from the balance assumptions with those derivable from the so-called regression effect appears obvious. We must concede their identity and simply suggest that the use of terms such as "balance" and "equilibrium" instead of a term such as "regression effect" is a matter of individual taste and theoretical orientation. No matter what terminology is applied to the phenomenon, however, one fact appears to derive clearly and unmistakably from the consideration and testing of its validity: *Our ability to understand and predict changes occurring to an area over some period of time is considerably enhanced by considering its position at the beginning of the time period relative to the average or regression behavior of similar kinds of areas.* This is essentially the point to which this paper is addressed. Whether the phenomenon be called balance or regression effect is irrelevant at this juncture, provided only that the potentialities of using the phenomenon be recognized in dealing with social change.

As a result of these considerations, we have restricted our analysis to a consideration of only those cases which are clearly out of balance according to the definition used here. We have not considered the behavior of other less deviant cases. Thus the eight most deviant municipios for each of the ten pairs of variables were selected and examined for the changes occurring to them over the following decade. The extent of the deviation of each of these municipios from the regression line in 1950 was recorded and compared to the amount of deviation exhibited by the same municipio from the regression line in *1960*. Alternatively, the 1950 deviation for the eight municipios from the 1950 regression line was compared to the 1960 deviation from the *1950* regression line.

Although it seems most likely that an imbalanced municipio undergoing social, economic, and demographic pressures to restore balance would be more likely to move toward a current balance condition described by the most current regression line, we felt it necessary to consider also the possibility that such a municipio would tend to move toward the earlier state of balance described by the earlier, regression line. Nothing in the previous discussions of imbalance and deviation from the regression line ever makes it quite clear which regression, the earlier or the later, most adequately reflects the supposed balance condition. Each change over the decade was thus tested twice, once by noting movement toward the 1960 regression line and once by noting movement toward the 1950 regression line. The relative stability of the regression lines considered tended to minimize the importance of this dilemma and to produce highly similar results in both methods of testing the movement.

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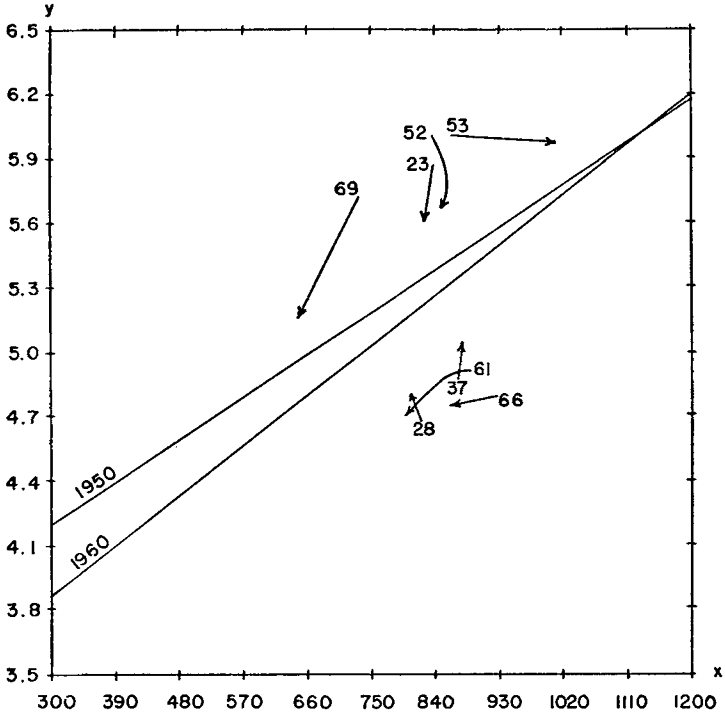
[8] "Regression effect" is the term frequently used to refer to the propensity for values highly deviant from a population or sample mean to become less deviant at a later point in time due to change fluctuations arising from sampling or measurement errors. See W. Allen Wallis and Harry V. Roberts, *Statistica—a New Approach* (New York: The Free Press of Glencoe, Ill., 1956), pp. 258–63.

Arguing from the balance assumptions and assuming that the regression line represents an equilibrium condition, while continued deviance from the regression line represents a low probability state, it follows that we would expect the deviations for the selected municipios to be less in 1960 than they were in 1950. The arguments seem equally likely to hold, whether the 1960 deviations are considered with respect to the 1950 regression or the 1960 regression. Our findings bear out these expectations and generally tend to support the arguments presented by the earlier proponents of these assumptions. Figure 1 provides graphic illustration of the nature of the changes which occur to these municipios.

In this case the relationship between



1950 Regression: Y = 3.539 + .0022X

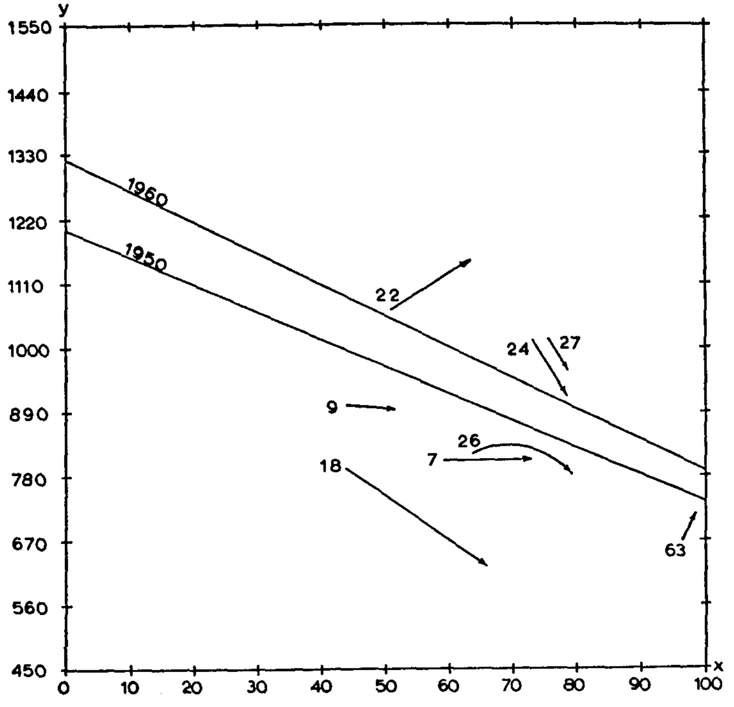
1960 Regression: Y = 3.084 + .0026X

No.	Municipio	(Y-Ŷ)1950	(Y-Ŷ)1960	S/F	(Y-Ŷ)1960/50	S/F
23	Corozal	.506	.422	S	.288	S
28	Guayama	-.595	-.344	S	-.483	S
37	Juana Diaz	-.510	-.290	S	-.404	S
52	Naranjito	.635	.390	S	.264	S
53	Orocovis	.577	.259	S	.200	S
61	Salinas	-.571	-.456	S	-.598	F
66	Santa Isabel	-.756	-.549	S	-.669	S
69	Trujillo Alto	.593	.395	S	.193	S
Sum of Abs. Dev.		4.743	3.105		3.099	

FIG. 1.—Population per Household (Y) and Fertility Ratio (X)

Population per Household and the Fertility Ratio for each municipio is analyzed. The two regression lines for 1950 and 1960 are given, and the eight municipios most deviant from the 1950 regression line are plotted. Their subsequent position in 1960 is also plotted, and a line connecting the two points is drawn, indicating the direction of change from 1950 to 1960. Every one of the eight municipios considered here exhibited change over the decade which placed it nearer the 1960 regression line than it had been to the 1950 regression line. When comparing deviations in 1960 from the 1950 regression line, one of the municipios, Salinas, changed in a manner which left it further from the 1950 regression line in 1960 than in 1950. These results yield eight successful predictions out of eight attempts on the first alternative and seven successful predictions out of eight on the second alternative.

Also given in Figure 1 is a table showing the computed deviations from the regres-



1950 Regression: Y = 1200 - 4.600X

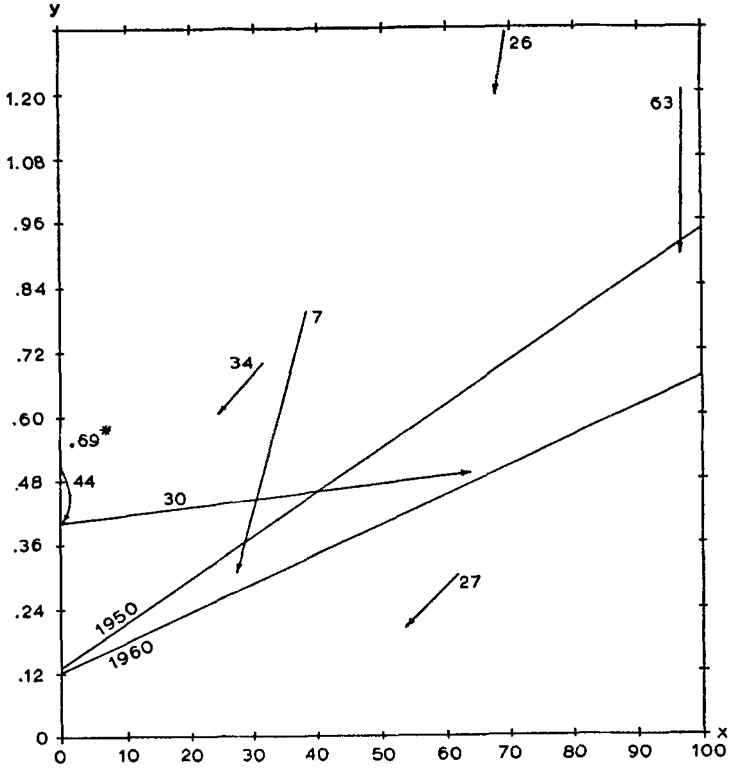
1960 Regression: Y = 1325 - 5.313X

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
7	Arecibo	-124.4	-127.0	F	- 53.9	S
9	Barceloneta	- 98.3	-152.3	F	- 63.7	S
18	Ceiba	-203.1	-344.8	F	-266.4	F
22	Comarío	99.2	154.3	F	234.7	F
24	Culebra	149.9	10.8	S	69.9	S
26	Fajardo	- 98.1	-122.9	F	- 54.5	S
27	Guánica	160.9	47.1	S	116.6	S
63	San Juan	- 99.7	- 95.1	S	-370.7	F
	Sum of Abs.Dev.	1033.8	1054.2		1230.4	

FIG. 2.—Total Dependency Ratio (Y) and Percent Labor Force in Non-agric. Employ (X)

sion line under the three conditions mentioned above—the deviation of the 1960 observations from the 1960 regression line and the deviation of the 1960 observations from the 1950 regression line. The success or failure of each prediction is indicated by an *S* or an *F* on the appropriate line for each municipio. Similar information is presented both graphically and statistically for each of the other nine pairs of relationships selected for analysis in Figures 2–10.

The proportion of all successful predictions for each relationship is given in Table 2 for both the comparison of 1950 deviations to 1960 deviations from the 1960 regression line and for the comparison of 1950 deviations to 1960 deviations



1950 Regression: Y = .1300 + .0082X

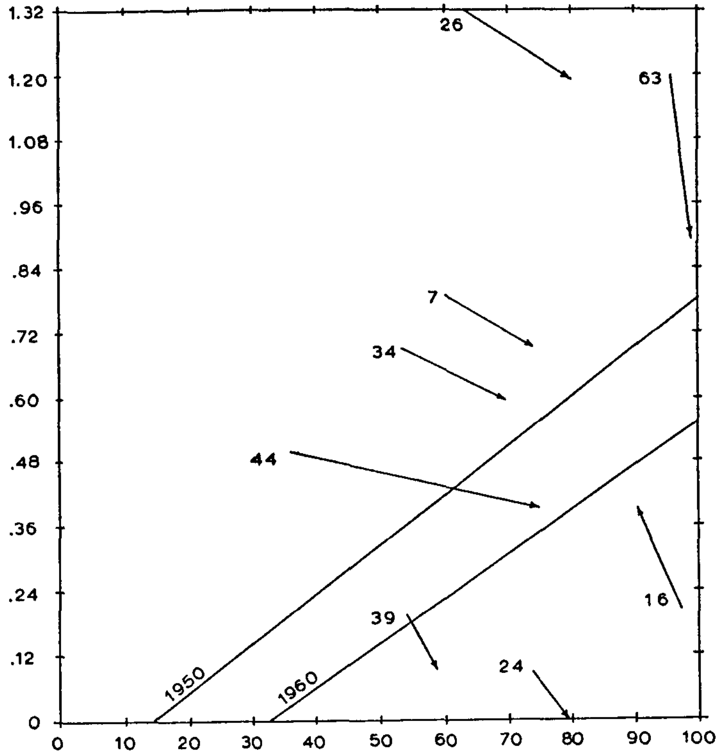
1960 Regression: Y = .1216 + .0055X

*No. 69 - No Change

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
7	Arecibo	.359	.351	S	.231	S
26	Fajardo	.630	.703	F	.519	S
27	Guánica	-.331	-.217	S	-.366	F
30	Guaynabo	.270	-.027	S	-.150	S
34	Humacao	.316	.345	F	.273	S
44	Luquillo	.370	.278	S	.270	S
63	San Juan	.277	.247	S	-.015	S
69	Trujillo Alto	.370	.378	F	.370	F
Sum of Abs. Dev.		2.896	2.546		2.194	

Fig. 3.—Doctors per Capita (Y) and Percent Urban (X)

from the 1950 regression line. Comparing the deviations in 1950 to the deviations in 1960 from the 1960 regression line, the 1960 deviations were smaller than those in 1950 in 69 per cent of the eighty comparisons made. With no active homeostatic tendencies, we could expect to guess the direction of change correctly in approximately 50 per cent of the cases. Our results differ significantly from those likely to be obtained by chance, the level of significance being less than .01. It then appears that the deviant municipios did tend to undergo changes in either or both of the two variables considered so as to restore balance within the municipio rela-



1950 Regression: $Y = -.1397 + .0091X$

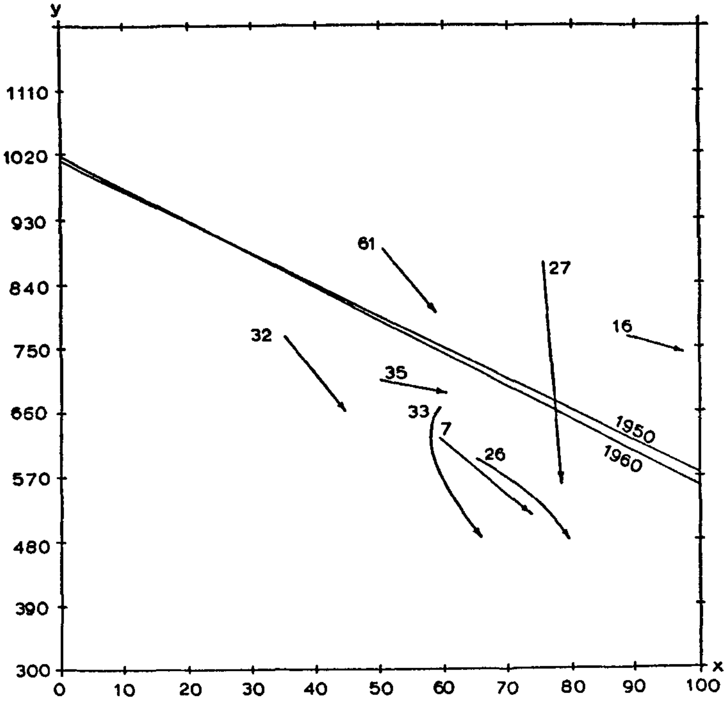
1960 Regression: $Y = -.2614 + .0082X$

No.	Municipio	$(Y-\hat{Y})1950$	$(Y-\hat{Y})1960$	S/F	$(Y-\hat{Y})1960/50$	S/F
7	Arecibo	.397	.362	S	.171	S
16	Cataño	-.282	-.332	F	-.545	F
24	Culebra	-.433	-.384	S	-.580	F
26	Fajardo	.858	.808	S	.611	S
34	Humacao	.351	.298	S	.112	S
39	Lajas	-.289	.026	S	-.146	S
44	Luquillo	.308	.059	S	-.132	S
63	San Juan	.470	.356	S	.141	S
	Sum of Abs. Dev.	3.378	2.813		2.438	

FIG. 4.—Doctors per Capita (Y) and Percent Labor Force in Non-agric. Employ (X)

tive to the balance condition described by the regression line for all municipios in Puerto Rico.

Utilizing the alternative mode of testing and comparing the 1950 deviations to the 1960 deviations from the 1950 regression line, the correct prediction of lower deviance in 1960 is made in 66 per cent of the eighty cases observed. These results differ from a chance occurence significantly at less than the .01 level of significance. Using either alternative in testing the propositions of homeostasis or balance, our results substantiate the argument that the regression condition represents a balance situation toward which most deviant or imbalanced cases are most likely to experience successive changes in either one or both of the two variables utilized in the regression equation.

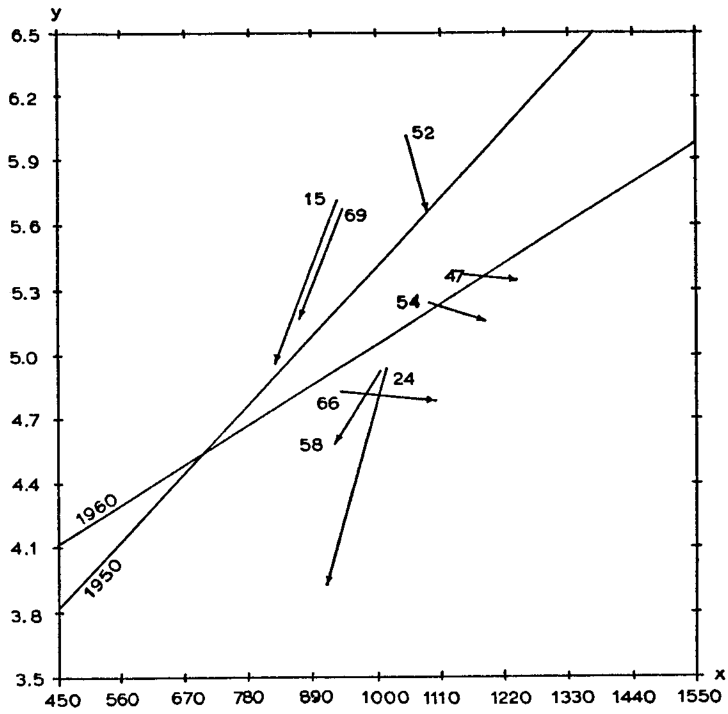


1950 Regression: $Y = 1014 - 4.338X$

1960 Regression: $Y = 1018 - 4.546X$

No.	Municipio	(Y-Ŷ)1950	(Y-Ŷ)1960	S/F	(Y-Ŷ)1960/50	S/F
7	Arecibo	-132.9	-164.0	F	-175.2	F
16	Cataño	141.4	168.7	F	152.7	F
26	Fajardo	-143.7	-173.0	F	-185.5	F
27	Guánica	188.0	- 94.8	S	-107.0	S
32	Hatillo	- 93.7	-154.1	F	-159.4	F
33	Hormigueros	- 91.6	-238.7	F	-248.2	F
35	Isabela	- 92.2	-103.6	F	-109.9	F
61	Salinas	94.1	54.1	S	45.9	S
	Sum of Abs. Dev.	977.6	1178.0		1183.8	

FIG. 5.—Fertility Ratio (Y) and Percent Labor Force in Non-agric. Employ (X)

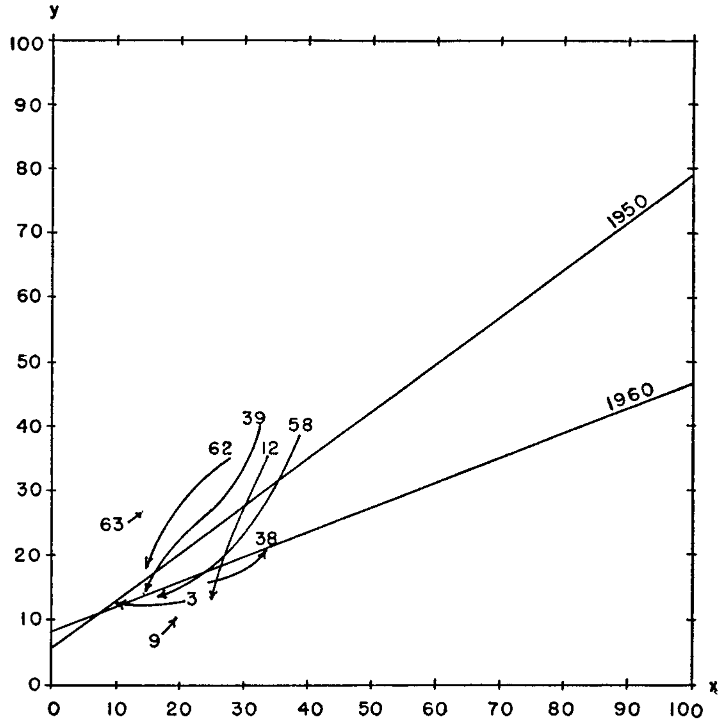


1950 Regression: $Y = 2.524 + .0028X$

1960 Regression: $Y = 3.386 + .0016X$

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
15	Carolina	.553	.221	S	.100	S
24	Culebra	-.482	-.962	F	-1.189	F
47	Muanabo	-.419	-.051	S	- .660	F
52	Naranjito	.508	.520	F	.090	S
54	Patillas	-.419	-.270	S	- .864	F
58	Rincón	-.458	-.315	S	- .551	F
66	Santa Isabel	-.466	-.383	S	- .816	F
69	Trujillo Alto	.512	.380	S	.214	S
	Sum of Abs. Dev.	3.807	3.102		4.484	

FIG. 6.—Population per Household (Y) and Total Dependency Ratio (X)

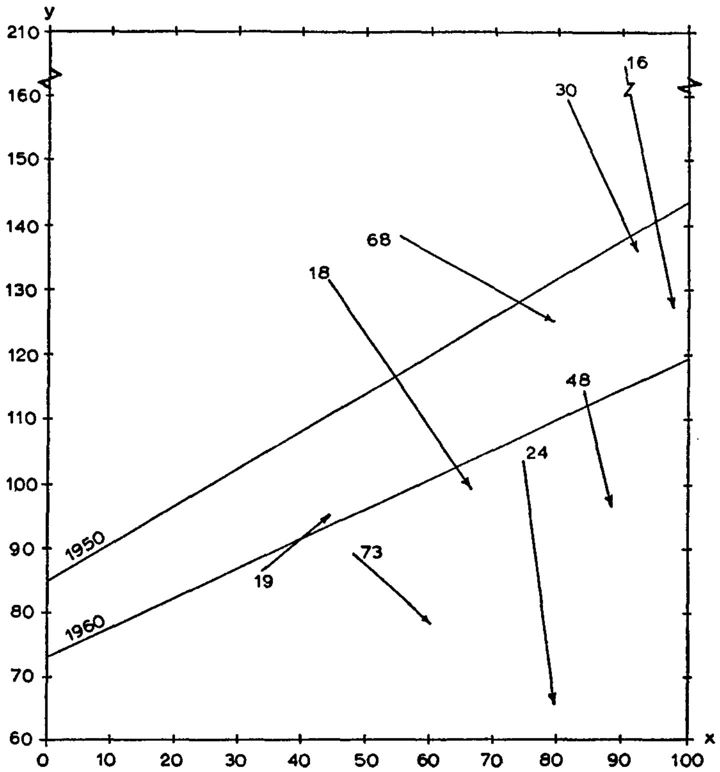


1950 Regression: $Y = 5.459 + .7357X$

1960 Regression: $Y = 8.402 + .3774X$

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
3	Aguadilla	-7.98	-0.38	S	-1.02	S
9	Barceloneta	-8.64	-4.42	S	-8.14	S
12	Cabo Rojo	7.66	-0.73	S	-3.12	S
38	Juncos	-7.84	-0.37	S	-9.94	F
39	Lajas	10.57	-0.01	S	-1.86	S
58	Rincón	7.24	-0.56	S	-3.57	S
62	San Germán	9.73	3.85	S	1.53	S
63	San Juan	11.78	13.15	F	11.11	S
Sum of Abs. Dev.		71.44	11.63		38.76	

FIG. 7.—Percent Women 14 + in Non-agric. Labor Force (Y) and Percent Labor Force in Manufacturing (X)

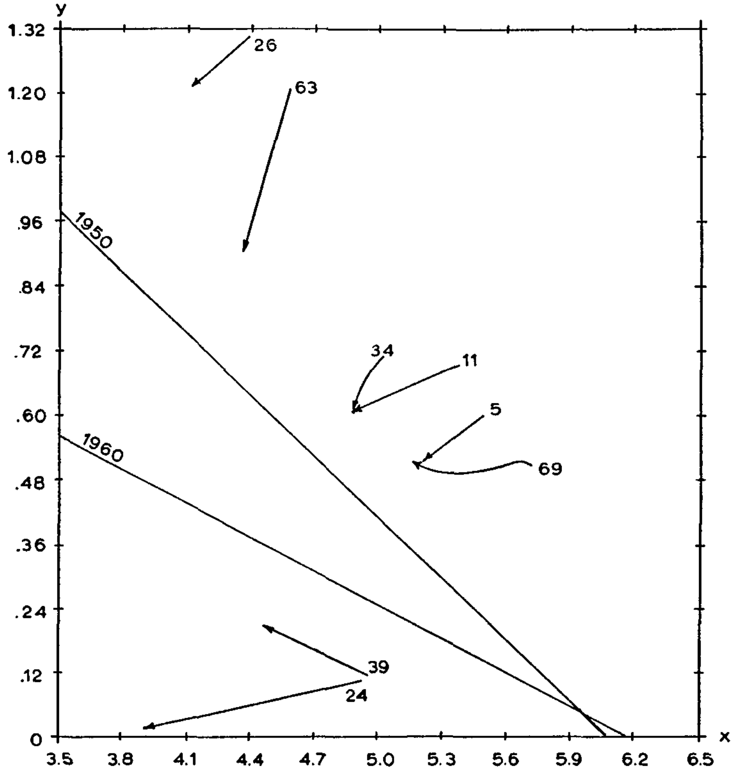


1950 Regression: Y = 85.27 + .5816X

1960 Regression: Y = 73.39 + .4556X

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
16	Cataño	66.81	9.23	S	14.90	S
18	Ceiba	20.00	- 4.75	S	-24.96	F
19	Ciales	-19.12	- 0.39	S	-17.80	S
24	Culebra	-25.04	-44.80	F	-66.68	F
30	Guaynabo	32.32	21.20	S	- 2.20	S
48	Mayagüez	-19.97	-17.50	S	-40.51	F
68	Toa Baja	20.61	15.80	S	- 5.78	S
73	Vieques	-24.27	-22.40	S	-41.78	F
	Sum of Abs. Dev.	228.14	136.07		214.81	

FIG. 8.—Population Growth Ratio (Y) and Percent Labor Force in Non-agric. Employ (X)

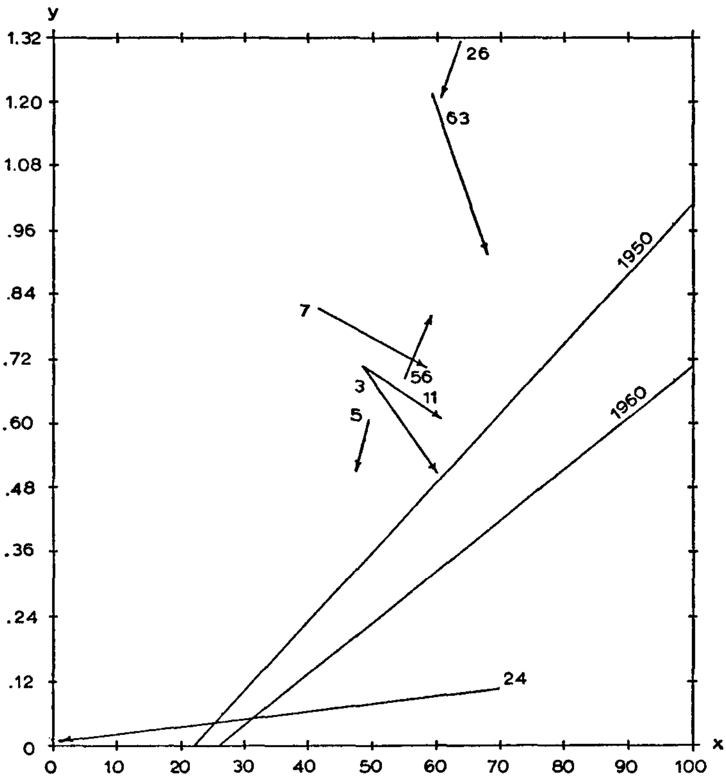


1950 Regression: $Y = 2.261 - .3703X$

1960 Regression: $Y = 1.276 - .2069X$

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
5	Aibonito	.380	.304	S	.172	S
11	Bayamón	.424	.331	S	.142	S
24	Culebra	-.346	-.470	F	-.817	F
26	Fajardo	.743	.768	F	.450	S
34	Humacao	.294	.329	F	.139	S
39	Lajas	-.298	-.157	S	-.413	F
63	San Juan	.639	.524	S	.250	S
69	Trujillo Alto	.354	.291	S	.150	S
	Sum of Abs. Dev.	3.478	3.174		2.533	

FIG. 9.—Doctors per Capita (Y) and Population per Household (X)



1950 Regression: $Y = -.3092 + .0133X$

1960 Regression: $Y = -.2724 + .0099X$

No.	Municipio	$(Y-\hat{Y})$1950	$(Y-\hat{Y})$1960	S/F	$(Y-\hat{Y})$1960/50	S/F
3	Aguadilla	.364	.182	S	.015	S
5	Aibonito	.253	.310	F	-.187	S
7	Arecibo	.532	.412	S	.255	S
11	Bayamón	.361	.275	S	.106	S
24	Culebra	-.515	.272	S	.309	S
26	Fajardo	.758	.869	F	.698	S
56	Ponce	.263	.488	F	.323	F
63	San Juan	.711	.501	S	.306	S
	Sum of Abs.Dev.	3.757	3.309		2.199	

FIG. 10.—Doctors per Capita (Y) and Percent 14–17 Population in School (X)

The results reported here are, admittedly, exploratory and have been conducted on units of analysis not necessarily comparable to those utilized by earlier investigators. Nevertheless, our findings appear to lend considerable credibility to the arguments advanced in those earlier analyses based upon equilibrium assumptions. Heretofore only a handful of investigators has attempted analyses of social change and public policy on the basis of balance and equilibrium assumptions, reflecting regression techniques, or analyses of average behavior. If, as this report seems to indicate, these methods of analysis have considerable validity, these techniques may provide us with a comparatively fresh and important insight into the problems of understanding, prediction, and control of social change.

Table 2.—PROPORTION OF CHANGES PREDICTED SUCCESSFULLY IN EACH RELATIONSHIP ANALYZED

X Variable	Y Variable	1960/60	1960/50
Fertility Ratio	Population per Household	8/8	7/8
Percent Labor Force in Non-agric. Employ	Total Dependency Ratio	3/8	5/8
Percent Urban	Doctors per Capita	5/8	6/8
Percent Labor Force in Non-agric. Employ	Doctors per Capita	6/8	6/8
Percent Labor Force in Non-agric. Employ	Fertility Ratio	2/8	2/8
Total Dependency Ratio	Population per Household	6/8	3/8
Percent Labor Force in Manufacturing	Percent Women 14+ in Non-agric. Labor Force	8/8	7/8
Percent Labor Force in Non-agric. Employ	Population Growth Ratio	7/8	4/8
Population per Household	Doctors per Capita	5/8	6/8
Percent 14-17 Pop. in School	Doctors per Capita	5/8	7/8
TOTAL		55/80	53/80
Percent predicted successfully		69%	66%